

CHAPTER 15

*Extended Mind and Religious Cognition***Joel Krueger***Lecturer in Philosophy, Department of Sociology,
Philosophy, and Anthropology
University of Exeter, England*

It is natural to think of our mind as being located in our head. When we think a thought or feel an emotion—including a religious thought or emotion—it feels like these mental states arise inside the private mental space of our own consciousness. This feeling is strengthened by the observation that we can (and often do) think and feel something without anyone else knowing about it. But *we* know—immediately and directly—our own thoughts and feelings. And we know these things in a different way than we do, say, the contents of our refrigerator or what’s happening with the Tokyo Stock Exchange. To get *that* information, we must direct our attention outward to the external world and take various steps to acquire it. But to know our own mental states, all we need to do is turn our attention inward. This is because we enjoy what philosophers call *privileged access* to an internal first-person perspective on our mental life.

These considerations seem to support the idea that the mind is entirely in the head. But not all philosophers and cognitive scientists accept this idea. Some of them argue that to understand the nature of the mind, we need to investigate how we use various artifacts and technologies to support and enhance our thinking. This is because these artifacts and technologies don’t simply help us think (although they clearly do); rather, they actually are part of our thinking. In other words, these thinkers argue that parts of the world—including parts that support religious thought and experience—can quite literally become *parts of our mind*. From this perspective, the mind isn’t something that’s just in our head. At times, it extends into the world via these thought-enhancing artifacts and technologies. This is the basic idea behind a philosophical view called the *extended mind thesis*.

Philosophers and cognitive scientists have, in recent years, debated the plausibility of the extended mind thesis, growing an immense body of literature. Yet despite its many supporters, relatively few attempts have been made to apply the thesis to religious studies, particularly studies of religious cognition. In what follows, I indicate how various dimensions of religious cognition might be thought of as extended. In particular, I focus on the mutually supporting relationship between religious cognition and *material culture*: the many things we use to organize and enact our religious practices and beliefs, from relics and

rituals to songs and holy spaces. As we'll see, taking the extended mind thesis seriously suggests that an investigation of religious material culture is, simultaneously, an investigation of religious cognition.

The discussion proceeds in three sections: first, I introduce the idea of embodied cognition and show how this increasingly influential approach sets the scene for the extended mind thesis. Next, I look in more detail at the extended mind thesis as developed by the philosophers Andy Clark (1957–) and David Chalmers (1966–), focusing on their famous thought experiment involving memory. I then consider how the extended mind thesis might productively inform investigations of three themes: religious cognition, religious emotions, and personal identity. Along the way, I canvass philosophical discussions as well as different streams of empirical literature to construct ways of thinking about the extended religious mind.

FROM THE EMBODIED TO THE EXTENDED MIND

SETTING THE SCENE: EMBODIED APPROACHES TO COGNITION

Within philosophy of mind and cognitive science, embodiment is currently a central theme in a family of views that fall under the label *embodied cognition* (for overviews of embodied cognition, see Shaun Gallagher's *How the Body Shapes the Mind* [2005], Raymond Gibbs's *Embodiment and Cognitive Science* [2005], and *The Routledge Handbook of Embodied Cognition* [2014], edited by Lawrence Shapiro). From an embodied perspective, distinctively human forms of thought, perception, and emotion are shaped by both the sorts of bodies we have (their physiology and morphology) as well as by the things they can do (their capacity for movement, action, and ability to use and incorporate various tools). Embodied cognition theorists reject models that conceive of the mind as entirely in the head. They argue instead that mind emerges within, and is at times even constituted by, patterns of world-involving *action*.

In addition to philosophical discussions, various lines of empirical evidence support this connection between mind and embodied action. For example, studies such as *Hearing Gesture* (2003) by Susan Goldin-Meadow and *Gesture and Thought* (2005) by George McNeill indicate an apparent link between gesture, thought, and language processing. So-called *enactive* approaches to perception, developed in J. Kevin O'Regan's *Why Red Doesn't Sound like a Bell* (2011) and Alva Noë's *Action in Perception* (2004), argue that perceptual consciousness is constituted by the ongoing exercise of sensorimotor skills. In the realm of emotions, many studies—such as those discussed in James D. Laird's *Feelings: The Perception of Self* (2007), Michelle Maiese's *Embodiment, Emotion, and Cognition* (2011), and Paula M. Niedenthal's "Embodying Emotion" (2007)—suggest that feeling, perceiving, thinking, and even speaking about emotions depends upon feedback from somatovisceral and motoric processes. In the domain of social cognition, research on *mirror neurons*, discussed in Giacomo Rizzolatti and Corrado Sinigaglia's *Mirrors in the Brain* (2008), suggests that visuomotor neurons fire both when an agent performs an action as well as when they observe someone else doing it. These lines of evidence support the idea that the body-beyond-the-brain shapes both the form and content of our mental life.

But our bodies are not fixed entities limited by their biology. Bodies are *plastic*, open to various forms of functional augmentation and enhancement. One way to bring out the

plastic character of embodiment is to look at how we routinely incorporate and merge with everyday items of our material culture, such as tools and technologies. These body-world incorporations are instructive. They indicate how material augmentations change not only the physical structure and functional capacities of our bodies, but also the *phenomenology* of our embodiment—that is, the way we experience our bodies as well as the way the world is disclosed to us *via* this bodily experience.

Consider picking up a cane and using it to probe our environment. After a few moments of practice, the cane is no longer experienced as an object that we hold, something distinct from us and our agency. Rather, as Maurice Merleau-Ponty (1908–1961) famously observed, the cane disappears, experientially speaking (Merleau-Ponty 1945); it becomes the transparent vehicle *through which* we perceptually access the world. And within this process, we experience a reconfiguration of our local sense of embodiment. When we skillfully use the cane to explore our world, we experience our body, as well as its attendant sensorimotor capacities, as extending into and through the cane. Additionally, we experience an expanded set of *action-possibilities* that flow from this altered sense of embodiment. The world shows up for us in a different way, as inviting interactions that weren't there before we picked up the cane. We can now reach, poke, probe, and manipulate previously inaccessible parts of our environment.

Empirical work supports the idea that our body and its capacities are open to material augmentation and extension. A striking example is Paul Bach-y-Rita's (1934–2006) work on sensory substitution and his technology known as tactile visual sensory substitution system (TVSS), initially designed to bring vision to blind subjects (see, for example, Bach-y-Rita, Mitchell E. Tyler, and Kurt A. Kaczmarek's "Seeing with the Brain" [2003]). TVSS is a prosthetic visual technology that relies on the body's ability to map information from one perceptual modality (e.g., sight) to another (e.g., touch). It operates by translating visual information from the environment, which enters through a head-mounted camera, into patterns of vibrations conveyed via stimulators in contact with the skin of the wearer's abdomen, back, thigh, or tongue. As blind subjects adjust to the experience of wearing TVSS while moving around their environment, they report quasi-visual experiences of three-dimensional objects—a kind of technologically augmented *tactile* vision. Moreover, the technology quickly becomes experientially transparent. The wearer no longer experiences the technology as an object but rather as something that has been integrated into her body and that now helps perceptually disclose the world in a new way.

We find similar examples of this phenomenon in everyday life: we wear glasses to improve vision, hearing aids to enhance auditory perception, braces to stabilize unsteady joints and enhance balance, and electric wheelchairs to provide mobility. Over time, these technologies disappear, experientially speaking, as we become comfortable using them and with the new ways of perceiving and acting they make possible. Likewise, skilled athletes and musicians routinely merge with their baseball bats and bagpipes, golf clubs and guitars, and in so doing experience an expanded sense of embodiment: they *live through* these technologies and artifacts onto the world and feel their bodies to have expanded both spatially (by integrating with these artifacts) and functionally (in terms of the new things they can do). Observations like these have led theorists to argue that we are *profoundly* embodied agents, "creatures for whom body, sensing, world, and technology are resources apt for recruitment in ways that yield a permeable and repeatedly reconfigurable agent/world boundary" (Clark 2007, 279).

TAKING THE NEXT STEP: THE EMBODIED MIND, EXTENDED

Thinking of embodiment as reconfigurable in this way can lead to another more radical thesis. This is the *extended mind thesis* (ExM). This expression was first proposed by Clark and Chalmers in their 1998 article, “The Extended Mind” (see also Richard Menary’s *The Extended Mind* (2010) for an introduction to various debates surrounding ExM). According to ExM, the physical machinery making up the mind is not necessarily confined to the head. Some mental states and processes are partially constituted by external resources—including items of our material culture—that lie beyond the boundaries of skin and skull. In other words, minds are (at least potentially) composed of biological and nonbiological parts.

ExM is not a brand new thesis. We find versions of this idea in pragmatist philosophers like William James (1842–1910) and John Dewey (1859–1952), as well as phenomenologists like Martin Heidegger (1889–1976) and Merleau-Ponty. For example, Dewey insists that “thinking, or knowledge-getting, is far from being the armchair thing that it is often supposed to be. The reason it is not an armchair thing is that it is not an event going on exclusively within the cortex.... Hands and feet, apparatus and appliances of all kinds are as much a part of it as changes in the brain” (Dewey 1916, 13–14). These philosophers were sensitive to the ways that the *kinds* of thought we’re capable of depend essentially on *the things we use to think*. These things can include both our bodies (e.g., using our fingers to count) as well as artifacts and technologies (e.g., counting with an abacus or calculator).

Contemporary defenders of ExM have incorporated these insights into their own thinking while developing a number of new arguments. The *locus classicus* of current discussions of ExM is Clark and Chalmers’s “The Extended Mind” (1998). Clark and Chalmers motivate ExM with a thought experiment involving two characters, Otto and Inga. Otto suffers from memory loss brought on by a mild form of Alzheimer’s disease. To cope, he carries a notebook with him wherever he goes. Whenever Otto picks up new information, he records it in this notebook. When he needs it—for example, when he wants to remember the location of Museum of Modern Art (MoMA) in New York so he can go see a new art exhibition he’s heard about—Otto simply consults his trusty notebook, retrieves the information, and acts on it. Inga, on the other hand, doesn’t have Alzheimer’s. She can use her biological memory in a way Otto cannot. When Inga hears about the same exhibition and decides to go see it, she pauses for a moment, consults her bio-memory to remember MoMA’s location, and sets off.

According to Clark and Chalmers, Otto’s use of his notebook is a case of extended cognition. Some of Otto’s memories and dispositional beliefs—such as his belief that MoMA is on 53rd Street—are housed outside of his head in his notebook. Importantly, the information in Otto’s notebook is poised to play the same role that Inga’s brain-bound information plays in supporting her beliefs and guiding her behavior. The only difference between these two cases, according to Clark and Chalmers, is that some of Otto’s beliefs lie beyond his skin (i.e., encoded in his notebook), whereas Inga’s beliefs are in her head (i.e., encoded in bits of her brain). From a functionalist perspective, which Clark and Chalmers endorse, it is mere prejudice to insist that only Inga’s internal brain-bound beliefs are genuinely cognitive, whereas Otto’s notebook-bound beliefs are not. For, when we look carefully at how these internal and external processes work, respectively, as well as what they enable each thinker to do, we see that their overall profile is identical. As Clark and Chalmers put it, there is *functional parity* between them—even if their physical constitution clearly differs. And for Clark and Chalmers, then, functional parity is ultimately sufficient for mentality. External elements can sometimes be part of our minds.

ExM has generated much debate in recent years (for important book-length critiques of ExM, see Fred Adams and Ken Aizawa's *The Bounds of Cognition* [2008] and Robert Rupert's *Cognitive Systems and the Extended Mind* [2009]). But we don't have to rely on thought experiments to make this idea plausible. Consider the many ways we routinely off-load cognitive states and functions onto the environment. We off-load memories, for instance, onto artifacts and material structures in our environment: smartphones and portable calendars help us recall appointments and phone numbers; sticking a note on the side of a computer monitor or by the door prompts memory of to-do items; as Shaun Gallagher notes in "The Socially Extended Mind" (2013), even social and cultural practices and institutions (political structures, religious rituals, legal systems) play a cognitive role by encoding the complex web of historical narratives, memories, beliefs, and procedural knowledge collectively learned over many generations. From the perspective of ExM, interacting with these external resources augments and extends our brain-bound biological capacities. Users link up and integrate with these external resources in an ongoing, mutually influencing way that ultimately leads to the emergence of an extended (i.e., user-artifact) cognitive system.

Clark and Chalmers originally argued that ExM includes non-conscious cognitive states, such as Otto's dispositional beliefs about MoMA, but not necessarily conscious mental states, such as perceptual experiences or emotions. But recently, theorists have moved beyond this limitation and expanded ExM discussions to consider a variety of topics, including perceptual consciousness, as in Dave Ward's "Enjoying the Spread" (2012); music cognition, as in Joel Krueger's "Affordances and the Musically Extended Mind" (2014a) and Tom Cochrane's "Expression and Extended Cognition" (2008); social cognition, as in Gallagher and Anthony Crisafi's "Mental Institutions" (2009), Krueger's "Extended Cognition and the Space of Social Interaction" (2011b), and Georg Theiner, Colin Allen, and Robert L. Goldstone's "Recognizing Group Cognition" (2010); and emotion research, as in Krueger's "Varieties of Extended Emotions" (2014d), Jan Slaby's "Emotions and the Extended Mind" (2014), and Giovanna Colombetti and Tom Roberts's "Extending the Extended Mind: the Case for Extended Affectivity" (2015). Taking seriously the *experience* of augmenting and extending our embodiment and cognitive capacities in various ways—that is, how it feels to be an extended mind from the first-person perspective—is now an important feature of these new directions in ExM literature.

EXTENDED RELIGIOUS COGNITION

Until now, there have been few attempts to apply ExM to religious cognition. In what follows, I pursue this idea by looking at how ExM can illuminate the various ways that religious cognition and experience are scaffolded by the ongoing contribution of external resources, including the wide array of structures and artifacts that make up religious material culture. I first consider extended religious *cognition*. I then turn to extended religious *emotions*. I look at some ways we use the world and things in it to think the unthinkable, focusing on the domain of religious cognition.

USING THE WORLD TO THINK THE UNTHINKABLE

To see how ExM intersects with religious cognition and material culture, we can begin by investigating another concrete example of materially scaffolded cognition. Note first that the

kinds of brains we have are good at some things (e.g., pattern recognition and completion) but not so good at others (e.g., logical or sequential reasoning). Nevertheless, we're still able to do the sort of reasoning we find so cognitively demanding. How so? We do so by recruiting features of the world to stand in as external *material representations* that amplify our cognitive abilities and open up new modes of thought and behavior (for a discussion of these ideas that predates the extended mind thesis, see David Rumelhart et al.'s "Schemata and Sequential Thought Processes in PDP Models" [1986]).

Consider multiplying two three-digit numbers. One way to solve this problem is to do it entirely in our head. From an orthodox computationalist perspective, we might think of the process this way: first, we see the symbols (487×721) on the page; next, we convert these symbols into internal representations and run various operations over them (i.e., we manipulate them according to the relevant mathematical rules); finally, these representations generate behavioral output in the form of writing down an answer (351,127). Voila! We've computed this problem purely by relying on internal resources.

A problem with this story is that it fails to capture how we actually solve problems like this in the real world. More precisely, it overlooks the central causal contribution our material environment makes in driving this process along and scaffolding our access to previously inaccessible forms of mathematical reasoning. Few of us can do this problem in our heads. Instead, we bring bits of our material culture into the cognitive loop by off-loading some of the process onto ready-made tools designed to help, such as the charmingly old-fashioned pencil and paper. Crucially, we manipulate these tools by allowing them to *materially represent* steps of the problem that otherwise would be attempted internally: for instance, we might use a long multiplication method by writing down the numbers in columns, working through the various procedures thereafter and, as we go along, jotting down intermediate products until we reach a final answer.

The important point here is that this off-loading process transforms what would otherwise be a difficult internal representational process (again, something we're not good at) into a tool-incorporating perceptuo-motor process (something we *are* good at) spread out across brain, body, and world. Like Otto's notebook, a pencil and paper potentially opens up new modes of thinking. Accordingly, these thought-enabling tools deserve equal cognitive credit alongside our internal bio-resources. Cases like these, ExM defenders argue, vividly show us how parts of our material culture "may be so integral to our cognitive routines as to count as *part of the cognitive machinery* itself" (Clark 2008b, 15).

RELIGIOUS TOOLS SHAPE THE RELIGIOUS MIND

So how does this relate to religious cognition? We can readily imagine analogous cases in the context of religious faith. Even the most devout believer probably can't remember each and every doctrine, practice, or teaching constitutive of their respective tradition. Luckily for them, they don't have to. One of the primary functions of religious texts—along with the different rituals and forms of worship constructed with them—is, precisely, to take over part of the remembering process for the believer. Like Otto's notebook-bound belief that MoMA is on 53rd Street, so, too, are some of the faithful's dispositional beliefs housed in frequently consulted devotional texts. As Colombetti and Roberts (2015) note, many people carry analogue (printed) or digital (in tablets or smartphones) versions of these texts constantly, making them accessible on a moment's notice. From the perspective of ExM, relying on these texts—as well as manipulating other objects such as a Catholic rosary or Hindu Japa

Mala prayer beads—ought to count as a part of the physical process constituting the individual's faithful disposition or religious sentiment.

Drawing on ExM, as well as work by cognitive archaeologists and cognitive anthropologists—for example, Stephen Mithen's "The Supernatural Beings of Prehistory and the External Storage of Religious Ideas" (1998); Merlin Donald's *Origins of the Modern Mind* (1991); and Edwin Hutchins's *Cognition in the Wild* (1995)—Matthew Day makes a similar argument in "Religion, Off-Line Cognition and the Extended Mind" (2004). He tells us that from the perspective of ExM, "The broad spectrum of rituals, music, relics, scriptures, statues and buildings typically associated with religious traditions are no longer seen as mere ethnographic icing on the computational cake. Rather than thin cultural 'wrap arounds' that dress-up the *real* cognitive processes going on underneath, they begin to look like central components of the relevant machinery of religious thought" (Day 2004, 116).

Although many examples in ExM focus on the role that artifacts play in scaffolding *online* cognition (i.e., time-pressured here-and-now tasks that unfold in response to changing environments), Day argues that religious material culture also transforms and augments *offline* cognition. Offline cognition is thinking *decoupled* from the immediate demands of the environment: our ability to reflect on the past, for instance, make plans for the future, or speculate about what might have been if circumstances had been different. Offline *religious* cognition may involve processes like reflecting on God's divine nature, determining how best to interpret a particular text, or thinking through the significance of particular ethical commands.

Day is especially interested in the deep role that material culture plays in allowing us to think about divine beings and transcendent realities whose natures and abilities are largely beyond the scope of logical thought and experience. Once more, the notion of artifacts serving as external material representations becomes important. Day notes that engaging with *unthinkable* deities and realities in religious worship or imagination, for example, presents a cognitive dilemma. On the one hand, despite their supernatural nature, the actions, decisions, and motivations of these deities are surprisingly intelligible. This is because they generally conform to our folk psychological expectations about *non-supernatural* agents. The God of Abrahamic traditions, for instance, or the many gods and goddesses of Hinduism possess beliefs, desires, and intentions. According to Robert N. McCauley and E. Thomas Lawson in *Bringing Ritual to Mind* (2002), they act for reasons; harbor memories; experience emotions like love, anger, and jealousy; and often are responsive to our attempts to communicate with them. Yet, on the other hand, they also possess properties and abilities we can barely even imagine: they exist outside of space and time but still causally intervene in human affairs; the God of Jews, Christians, and Muslims knows everything, is everywhere at once, and is composed of nonphysical stuff—or a mysterious mixture of both human and divine reality (e.g., Jesus). As Pascal Boyer writes, our religious concepts in this way simultaneously preserve and violate our ontological expectations about the world (Boyer 1994).

So how do religious relics, images, statues, songs, paintings, and even the architecture of worship spaces help us think the unthinkable? By serving as tangible and persistent material representations of divine beings and realities, they ensure that "on-line cognition, safely coupled to anchoring real-world structures, can reach out toward the realm of the invisible, the untouchable, the barely conceivable" (Clark 2010, 24). Like the process of off-loading some of our mathematical computations onto pencil and paper—and thus transforming an

offline in-the-head process into an online perceptuo-motor activity—religious artifacts play a similar thought-transforming role. And this is precisely what we *need* them to do.

For although we're quite good at inventing nearly unimaginable supernatural beings—the immense number of deities in religious traditions around the globe testifies to this talent—Mithen (1998) notes we're not so good at understanding, remembering, or transmitting specific religious ideas and beliefs *about* those beings. But this is where we once again quite literally bring material culture into the cognitive loop. By presenting tangible features that can be touched, handled, and manipulated in real time, the various forms of cognitive scaffolding that make up religious material culture are designed specifically to help users substitute difficult *offline* problems that arise from thinking and talking about invisible supernatural agents with counterintuitive natures for more accessible *online* cognitive tasks they're much better at: things, says Day (2004), like recognizing patterns, modeling simple worldly dynamics, and manipulating objects. These online engagements with material artifacts allow agents to quite literally get a better grip on the paradoxical nature of supernatural beings that are part of their belief system.

This idea gains force when we consider its application in nonreligious contexts. We regularly use material artifacts (sketches, prototypes, models, storyboards, computer simulations, and the like) to construct “surrogate situations” (Clark 2010, 24): stable, configurable representations of some future event or as-yet-nonexistent state of affairs. When planning a bridge, for example, we might take the process offline by internally imagining a range of things like potential designs, construction details, and phases of the construction process. But this would be a high cost, low-return strategy. A better strategy—one that people actually *use*—is to let the world do some of our thinking and representing: for example, by using a dotted line or small stick to indicate on a blueprint, drawing, or sketch the proposed location of a strut. In this way, surrogate situations like models or prototypes allow planners to extend their cognitive reach into the future; they engage with as-yet-unrealized possibilities by manipulating tangible here-and-now representations in material formats. A resource-intensive process (i.e., in-the-head simulation) is fluidly transformed into a more manageable perception-action task utilizing external resources that are publically available, ripe for real-time collaboration with others.

Given the ubiquity of these practices in everyday life, it shouldn't be a surprise to find them in the context of religious cognition. And if something like this story is true, it suggests a need to rethink the distinction between religious *thought* (i.e., the concepts, metaphors, and arguments normally thought to be the realm of theologians and philosophers) and religious *material culture* (i.e., the artifacts, practices, and spaces normally thought to be the realm of archaeologists, anthropologists, and historians) (see Lambros Malafouris's *How Things Shape the Mind* [2013] for a similar argument that goes beyond religious cognition and material culture). By looking at the latter, we actually discover new modes and materializations of the former.

EXTENDED RELIGIOUS EMOTIONS

Although emotions received little attention in early discussions of ExM, they've now assumed an increasingly prominent role in current debates—for example, see J. Adam Carter, Emma C. Gordon, and S. Orestis Palermos's “Extended Emotion” (2016); Colombetti and Roberts's “Extending the Extended Mind: the Case for Extended

Affectivity” (2015); Krueger’s “Emotions and the Social Niche” (2014b) and “Varieties of Extended Emotions” (2014d); Slaby’s “Emotions and the Extended Mind” (2014); and Achim Stephan, Sven Walter, and Wendy Wilutzky’s “Emotions beyond Brain and Body” (2014). As Chalmers notes in his foreword to Clark’s 2008 book, *Supersizing the Mind*, the idea is that “perhaps one might have something akin to an extended mood, if not an extended emotion, when one’s environment is always nudging one toward happiness or sadness” (Clark 2008a, xiv). As we’ll see in more detail, there does appear to be a tight link between the way we use material culture to organize and manipulate different spaces (home, work, and so on), and the sort of moods and emotions we routinely feel when we inhabit and negotiate these spaces (for further discussion of these ideas, see Colombetti and Krueger’s “Scaffoldings of the Affective Mind” [2015] and Krueger’s “Musicing, Materiality, and the Emotional Niche” [2015]). Moreover, moods and emotions, such as awe, wonder, joy, love, despair, gratitude, contrition, guilt, and compassion, seem to be a central part of religious experience. As the cases discussed next make clear, very often the material context in which we enact our religious practices, and the tools we use to enact them, are designed specifically to scaffold the emergence and ongoing development of these feelings.

MUSICALLY SCAFFOLDED EMOTIONS

To bring this idea into sharper relief, consider the role that music—a prominent part of most religious practices—plays in eliciting and organizing our emotions (for a more detailed discussion of ExM and music cognition, see Krueger’s “Affordances and the Musically Extended Mind” [2014a], “Musical Manipulations and the Emotionally Extended Mind” [2014c], and “Musicing, Materiality, and the Emotional Niche” [2015], as well as Cochrane’s “Expression and Extended Cognition” [2008], and Luke Kersten’s “Music and Cognitive Extension” [2014]). Ethnomusicologists generally assume that all cultures have music and use it to regulate emotions and behavior and to intensify social bonds. At the neural level, music perception and emotional experience appear to be integrated processes. Neuroimaging studies suggest that our musical responses involve many regions of the brain—prefrontal cortex, motor cortex, somatosensory cortex, temporal lobes, parietal cortex, occipital cortex, cerebellum, and limbic regions (composed of the amygdala and thalamus)—including those involved in generating, detecting, maintaining, and regulating emotions (see, for example, “Emotional Responses to Pleasant and Unpleasant Music Correlate with Activity in Paralimbic Brain Regions” [1999] by Anne J. Blood et al.; “Brain Correlates of Music-Evoked Emotions” [2014] by Stefan Koelsch; and “Being Together in Time: Musical Experience and the Mirror Neuron System” (2009) by Katie Overy and Istvan Molnar-Szakacs).

To understand why music is such a powerful tool for scaffolding emotions, consider what we might refer to as the *world-making* power of music. We don’t hear music as mere *noise*. Rather, we hear it as *meaningful*. We encounter music as an experientially rich environment affording different modes of listening and bodily engagement, from nodding or tapping our fingers to full-blown episodes of ecstatic dancing (see Eric Clarke’s *Ways of Listening* [2005] and Krueger’s “Enacting Musical Experience” [2009] and “Doing Things with Music” [2011a] for more on this idea). In other words, music is perceptually encountered as an external resource, as a tool *we can do things with*: it creates an environment we can attentively explore and manipulate as we actively use music to guide and shape our musically driven emotions and behavior. As Tia DeNora argues in *Music in*

Everyday Life (2000), this becomes apparent by looking at the various ways we actively use music in everyday life, including in religious contexts.

For example, we deliberately play specific kinds of music at specific times and in specific places; in so doing, we use music to manage the organizational dynamics of different spaces. And this musical management has emotional consequences. Compare playing classical music at a low volume in the background of a formal dinner party versus suddenly blasting pop music from speakers in the next room. In the former case, the music provides unobtrusive background color, gently nudging guests toward certain patterns of situationally appropriate emotional experience and behavior (speaking calmly, remaining in one's seat, observing rules of formal dinner etiquette). In the latter case, the loud pop music abruptly reconfigures the space of that same environment by introducing novel sonic elements as well as, importantly, novel *action possibilities*. Guests might now get up, move to the next room, and start dancing, laughing, and talking loudly. Because the musical structure of that space has changed, these new actions—along with new emotional responses and performances—are not only felt as *possible* but also as *appropriate*.

In a religious context, music plays a similar function. Slower reverent music—at a funeral, for instance—establishes a tranquil space gently nudging guests toward reflection, grief, and introspective remembrance. But not all funerals are somber affairs, and their musical character reflects this variation. Within the Southern Baptist tradition in the United States, for example, African American funerals may begin with mournful singing and prayer but soon transition into joyful affairs—complete with dancing, shouting, and exuberant up-tempo praise hymns—that celebrate the deceased's eternal reunion with Christ. Music is a central part of this process, scaffolding the participants' moods and emotions and dynamically organizing their behavior as they pass through various phases of this collective experience. In this way, music is routinely used in religious and nonreligious contexts alike as a tool to manipulate our emotions and behavior by manipulating the practical and normative spaces of different environments.

Moreover, because musical engagements are richly *cross-modal* and *whole-body* experiences—affecting listeners in an ongoing way at neurophysiological, behavioral, and experiential levels—music can be thought of as a persistent environmental source of emotion-specific bioregulatory feedback. Put otherwise, when we listen to music, it becomes part of a self-stimulating feedback loop (like Otto's notebook) that drives, structures, and regulates the character and development of various embodied processes responsible for emotion, action, and experience. By stimulating and directly modulating these particular neural and physiological responses, music functions as a real-time emotion regulator: it coaxes emotions out of us and actively shapes their dynamics as they unfold in real time—see, for example, Petr Janata, Stefan T. Tomic, and Jason M. Haberman's "Sensorimotor Coupling in Music and the Psychology of the Groove" (2012); Maria A. G. Witek et al.'s "Syncopation, Body-Movement and Pleasure in Groove Music" (2014); and W. Luke Windsor and Christophe de Bézenac's "Music and Affordances" (2012). So, when we play music or enter into a preestablished, musically structured soundworld—such as those we find in a church, mosque, or temple—by temporarily inhabiting this soundworld, we let music take over some of the emotion-specific bioregulatory work. In taking over this regulatory role, music functions much the way that input from a skilled dance partner extends, transforms, and—in an important sense—*completes* the shape of our own dancing responses. In short, music becomes an active partner in helping us to construct and regulate our emotional experiences. Without the ongoing input of the

music, much like Otto and his notebook, we wouldn't be able to access these musically scaffolded emotions.

MUSICAL ACTIONS, MUSICAL MEMORIES

Music can exert a powerful cognitive impact in other ways, too. For example, music scaffolds processes of social bonding by synchronizing the moods and emotions of a large number of people (via the processes just discussed), which can promote the large-scale synchronization of joint action and behavior. This is a central *ritualistic* function of music. Rituals are patterns of organized behavior that follow a prescribed form or order. They can unfold at multiple time-scales, from moments to several years or a lifetime, and can involve few people (e.g., two people kneeling to chant, pray, or sing a hymn) or many (e.g., an entire nation observing a predetermined moment of silence). Within a ritualistic context, music often plays a central role in driving and organizing the different practices and behaviors that compose it.

For example, musical qualities, such as rhythm, melody, and pulse (i.e., periodic accents repeated at regular intervals), order the temporal structure of a religious event. These musical structures facilitate organized movements and behavioral coordination between participants by providing environmental cues enabling groups of individuals to move and act in time, as one. Think of the way that musical intervals order nearly every aspect of a formal worship service in the Anglican or Lutheran traditions of Christianity. In these traditions, musical cues (generally organ or choral music) signal when to sit, stand, kneel, pray, or greet one's fellow worshippers; they also signal the start of the gospel reading, tell participants when to approach the front of the church for communion, and even determine what sort of actions are appropriate during a particular phase of the service (e.g., slow, thoughtful music when filing back to one's seat after communion versus buoyant end-of-service music signaling the freedom to get up and mingle).

In this way, musical structures can encode particular instructions or action scripts constitutive of a given ritual. Instead of participants having to remember each and every movement or sequence of actions, they can *off-load* this cognitive responsibility onto the music and let it take over and govern their behavior. Musical structures thus *materialize* time; they are external representations that tell participants when and how to act. As Gilbert Rouget observes in *Music and Trance* (1985), we might think of music this way as a kind of sonic architecture that gives time a material reality it doesn't normally seem to have; music indicates that things are happening right here, right now—and that certain rule-governed actions are now appropriate relative to the demands of the music.

But music doesn't only guide action. It also encodes ritualistic practices and action scripts and, in so doing, preserves their memory over many generations. Canonical musical practices are thus *intergenerational* scaffolding. Songs, hymns, chants, and sung prayers continually remind worshippers of their religious duties and action and, as we've seen, they elicit and regulate the appropriate mood or emotional response. They also are the vehicle for both communicating and preserving the stories, myths, legends, beliefs, and practices of a religious tradition across multiple generations. As Wanda T. Wallace explains in "Memory for Music: Effect of Melody on Recall of Text" (1994), rhythms and melodies *chunk* words and phrases, identify line lengths and stress patterns, and help listeners focus on important words of a text. Music augments memory by scaffolding processes of learning, retrieving, remembering, and reconstructing texts, including religious texts encoding the beliefs and practices of their respective traditions.

MUSIC AND RELIGIOUS IMAGINATION

To return to Mithen's observation in "The Supernatural Beings of Prehistory and the External Storage of Religious Ideas" (1998), religious music can play yet another cognitive role. Like relics, statues, and paintings, musical pieces—as well as the instruments used to make and listen to music—can serve as cognitive anchors that enable believers to better get a grip on elusive properties of certain religious teachings while simultaneously arousing an emotion-laden sense of wonder and transcendence.

Consider the shakuhachi, the Japanese flute often used to supplement Zen meditation. According to Ian W. Mabbett in "Buddhism and Music" (1993), this flute plays a dual cognitive role. On one hand, its material structure is meant to mirror the harmonized structure of mind and universe: the straight upper part of the flute, fashioned from the bamboo stem, symbolizes clarity, light, and the heavens (*yang*), whereas the rough unformed bottom, cut from the underground bamboo root, symbolizes mystery, formlessness, and the darkness from which everything emerges and to which it eventually returns (*yin*). The concept of *yin-yang* is normally associated with various Chinese schools of philosophy, such as Daoism. But Daoism, particularly the version developed by Zhuangzi, was influential in shaping the reception and development of Buddhism in China, including Chan (Japanese, Zen) Buddhism. As Mabbett notes, "There is a great deal of Taoism in the Zen spirit" (1993, 19). This structure provides a tangible representation of the mutually sustaining interplay of these two psycho-cosmological principles. Additionally, the breathy, ethereal sounds produced by the flute—which gently swell and recede and are characterized by their soothing yet slightly raspy or *unformed* quality—summon a felt sense of impermanence and change, an experiential encounter with the dynamic intermingling of being and nothingness at the heart of Zen Buddhist cosmology.

Both structurally and sonically, the flute represents properties of mind and universe that, from a purely conceptual standpoint, otherwise might seem contradictory or beyond the scope of our thinking. By embodying these teachings in material and sonic form, the shakuhachi becomes a perceptual prosthesis for (quite literally) *gripping* these teachings in an immediate visceral way. The sorts of cases discussed in this section affirm anthropologist Clifford Geertz's (1926–2006) observation that musical spaces, and the artifacts that comprise them, provide the imaginative context in which "the lived-in order merges with the dreamed-of order" (quoted in Small 1998, 98).

OTHER EMOTIONAL SPACES, PLACES, AND ARTIFACTS

Music may be the most powerful artifact we have for scaffolding our emotions. But other parts of religious material culture play a similar role. Consider weddings. Wedding ceremonies are an important part of nearly every culture; for many, they are also deeply imbued with religious significance. Most of us grow up attending many weddings, and we quickly learn that they are meaningful events. The intense emotions experienced and expressed at weddings reflect this significance.

But these emotions are not simply feelings participants bring *to* the wedding. The material dimensions of the wedding context play an ongoing role in scaffolding the real-time performance and experience of emotions. The wedding context is full of artifacts purposefully designed to facilitate the appropriate feelings: special music and singing; codes of dress and behavior; ritualized aspects of the ceremony and celebration; and features of the setting, such as decorations, food, and the building or location itself (e.g., a church, temple, or specific natural locale). The deliberate organization and structure of these material factors

helps participants cultivate the appropriate emotions at the right time. For example, as Brian Parkinson, Agneta H. Fischer, and Antony S. R. Manstead write in *Emotions in Social Relations* (2005), the particular setting of the church—with its ornate yet somber decorations, rich organ music, particular sequencing of actions and ceremonial phases, and conventional responses from the congregants—is composed of interconnected material elements that collectively elicit and regulate participants' emotional responses at an implicit level.

These material factors guide participants' attention and regulate their emotional experiences and expressions in real time. But they also encode what Hazel Markus and Shinobu Kitayama writing in "The Cultural Construction of Self and Emotion: Implications for Social Behavior" (1994) call *ideational* factors, too. The paintings, statues, music, songs, food, clothing, and architecture—as well as the practices surrounding these items—will vary greatly, depending on the beliefs and teachings of the particular religious tradition of which they are a part. For example, contrast the material setting of a wedding in a Catholic church, say, versus a Hindu or a secular wedding ceremony. Accordingly, these items not only scaffold emotional experiences but also embody distinct values, norms, and practices governing distinct emotion scripts and display rules—in other words, ideational factors determine how these context-specific emotions are *expressed*.

Other examples abound. A Catholic confessional, for example, is a clear representation of how ideational and material factors interpenetrate in religious cultural artifacts. The confessional (a small enclosed booth used for the Sacrament of Penance) is an emotional artifact whose structure is designed specifically to place practical constraints on emotional conduct and experience. Its structure minimizes distraction and embarrassment by blocking out the external world; and it encourages openness and trust by creating an intimate space between priest and parishioner (separated by a grid or lattice) in which sins can be freely confessed. In this sense, the confession booth functions as an emotion-regulating bit of technology that simultaneously embodies and sustains values and practices (i.e., ideational factors) central to the Catholic faith.

According to Colombetti and Krueger (2015), even the more general architectural and interior design spaces of churches, temples, and mosques can be manipulated to scaffold emotional responses and embody ideational factors. These spaces often are designed explicitly to evoke a variety of feelings—faith, hope, awe, love, compassion, and guilt—supported by various artifacts, practices, and arrangements. This can be seen in the way that some contemporary churches have reconfigured the layout of their worship space in response to the evolving emotional needs and desires of modern parishioners.

For example, in the early 1960s, the Roman Catholic Church changed the spatial arrangement of the Eucharist. Traditionally, the priest would stand at the altar, facing away from the congregation as he led them through the sacrament. But contemporary worshippers desired a more interpersonal experience. Following the change, the priest moved behind the altar but *faced* the congregation in a more accessible dialogical stance. In *How to Read a Church* (2004), Richard Taylor explains that other material manipulations—such as the way the altar has, in some churches, migrated from a distant and elevated area of the chancel to the middle of the nave at the same level of the congregation, where it is often surrounded on all sides by pews—similarly reflect changing values and emotional needs. These new arrangements speak to the desire for a more direct emotional connection with the priest and God. These arrangements also affect the worship experience by strengthening the sense of sharing in a collective experience and forming a unified body of believers.

Similar processes are reflected in the design of other contemporary Christian worship spaces, many of which eschew traditional arrangements, icons, and liturgies. Instead, the interior spaces of these contemporary churches are much more casual than their traditional counterparts. Some look like the inside of a theater or entertainment venue. Instead of wooden pews and a pulpit, one finds comfortable chairs and elaborate stages with advanced audiovisual technologies. Services are celebrated with rock music, light shows, and videos—and worshippers are encouraged to stand, sing, and energetically participate. Again, these contemporary forms of worship have arisen in response to the changing values and emotional needs of modern audiences.

EXTENDED MIND, EXTENDED SELF?

Finally, we briefly consider how ExM may affect considerations of selfhood and personal identity, traditionally central themes in religious literature. Thus far, discussions of ExM have had relatively little to say about implications of the view for thinking about the self (but see Michele Merrit's 2013 article "Instituting Impairment: Extended Cognition and the Construction of Female Sexual Dysfunction" for a rich discussion of ExM, gender, and identity). This is somewhat surprising. As Wilson observes in "Meaning Making and the Mind of the Externalist" (2010), many of the arguments for ExM—including Clark and Chalmers's original Otto case—are cyborg fantasy arguments. As we've already seen, they involve cases in which an individual's cognitive performance is so deeply scaffolded by some external technology that (so it is argued) no principled reason exists for claiming the technology isn't a proper part of the individual's cognitive system. Although his notebook is decidedly old-school technology, Otto is nevertheless still a cyborg—a posthuman, biotech blending of animal and machine.

Although few theorists working on ExM have tackled this topic directly, the question of how ExM might affect thinking about the self has been present from the start. At the end of their article, Clark and Chalmers ask (and then answer) the following question:

What, finally, of the self? Does the extended mind imply an extended self? It would seem so. Most of us already accept that the self outstrips the boundaries of consciousness; my dispositional beliefs, for example, constitute in some deep sense part of who I am. If so, then these boundaries may also fall beyond the skin. The information in Otto's notebook, for example, is a central part of his identity as a cognitive agent. What this comes to is that Otto *himself* is best regarded as an extended system, a coupling of biological organism and external resources. To consistently resist this conclusion, we would have to shrink the self into a mere bundle of occurrent states, severely threatening its deep psychological continuity. Far better to take the broader view, *and see agents themselves as spread into the world* [emphasis added]. (Clark and Chalmers 1998, 18)

Elsewhere, Clark affirms this picture of the extended self. He tells us that if we accept something like the model of mind ExM gives us, there is no self—if, that is, by *self* we mean some cognitive essence that constitutes the unchanging core of who and what we are. Rather, ExM offers a much more fluid, dynamic, and *changeable* picture of the self—what Clark terms a "soft self" made up of a "a rough-and-tumble control-sharing coalition of processes—some neural, some bodily, some technological—and an ongoing drive to tell a story, to paint a picture in which *I* am the central player" (Clark 2007, 114).

It thus would appear that if we accept ExM, we should be inclined to accept a similar picture of the self as spread out into the world, partially constituted by the environmental resources that scaffold its thinking, experience, and action. But not everyone accepts this conclusion. In “Persons and the Extended Mind Thesis” (2009), for example, Lynne Rudder Baker characterizes herself as a “traditional externalist” (646), which means that she takes social, linguistic, and physical environments to play essential roles in determining our cognitive and behavioral capacities. Yet she resists the extended picture of the self Clark thinks flows naturally from ExM. Instead, Rudder Baker argues that although some cognitive *processes* may loop out into the world and encompass both organic and non-organic parts—for example, extended memories composed of brain states plus notebook—these processes still require an entity *doing* the processing: an agent or conscious subject of experience. In other words, these cognitive processes aren’t just free-floating phenomena. They need an *owner*. And that owner, Rudder Baker further argues, is constituted by her organic body; she spatially coincides with her body and thus does not extend beyond it. In this sense, then, Rudder Baker thinks (*contra* Clark) that there *is* something relatively fixed about the self. Selves—conceived of as unified first-person perspectives—spatially coincide with their bodies, even if some of the physical processes responsible for their mental states simultaneously extended into the world.

In “The Metaphysics of the Extended Mind in Ontological Entanglements” (2011), Anna Marmodoro argues for ExM’s theological significance in the context of *divine* selfhood. She applies ExM to Christian metaphysics, particularly the relation between the divine nature of the Trinity (God the Father, God the Son, and the Holy Spirit) and the identity of Jesus, incarnate in human form. According to orthodox Christianity, Jesus is simultaneously constituted by both immaterial (as God the Son) and material (as a human being) substances. The central metaphysical mystery of the incarnation is to clarify how we might conceive of this relation—that is, how Jesus, as both God and man, might constitutionally partake of the material world. Marmodoro argues that ExM can help shed light on this mystery. Specifically, she argues that we might think of the divine mind (God the Son) extending into an external resource (Jesus) to carry out some of its mental activities within the order of creation. God the Son and Jesus are ontologically entangled, much the way that Otto and his notebook are ontologically entangled when they come together to form an environmentally extended cognitive system. Likewise, God the Son, according to Marmodoro, is “extensively empowered by Jesus within the human social reality” (2011, 223), in that Jesus—in human form—serves as the vehicle for his causal interventions in the natural order. Yet, just as Otto is never wholly *reducible* to his notebook (and vice versa) while cognitively extended by it, God the Son and Jesus similarly retain their distinct identities, despite this ontological entanglement.

Summary

This chapter has indicated a number of ways that ExM might productively inform religious studies, particularly considerations of religious cognition and material culture. Until now, there have been relatively few attempts to bring ExM into conversation with religious studies. This should change. As should now be clear, ExM offers fruitful resources for illuminating the many ways religious thought and experience are deeply scaffolded by the practices and material contexts in which they occur.

If ExM is on the right track, many of the tools we use to organize and enact religious thoughts and feelings are not mere prompts or supplements distinct from those religious thoughts and feelings. Rather, they are proper parts of those thoughts and feelings themselves. The very way we are able to think about the nature of divine beings, for instance—such as trying to understand how they can simultaneously have both natural and supernatural properties—may depend on our engagements with the material representations of these beings we routinely look at, touch, and handle as part of our everyday religious practices. Similarly, the array of emotions that regularly arise within religious contexts may be driven, organized and scaffolded by the different musical practices that are a central part of these contexts. As we've seen, religious music—along with other artifacts such as texts, icons, and rituals—may even play a central role in scaffolding religious memory, including processes of learning, retrieving, and acting out the many beliefs and practices distinctive of a particular tradition. Finally, ExM potentially contributes important theoretical resources for thinking through the nature of religious selfhood and personal identity, both at the human level as well as the divine.

One of the enduring lessons from this engagement between ExM and religious cognition, then, is that although religious cognition may routinely traffic with the otherworldly and the transcendent, ExM reminds us that we also are decidedly embodied and immanent beings. This immanence is reflected in the ways we make and use an impressive array of tools for thinking. But from the perspective of ExM, these things also shape *us*—perhaps every bit as much as we shape them.

Bibliography

- Adams, Frederick, and Kenneth Aizawa. *The Bounds of Cognition*. Oxford: Blackwell, 2008.
- Bach-y-Rita, Paul, Mitchell E. Tyler, and Kurt A. Kaczmarek. "Seeing with the Brain." *International Journal of Human-Computer Interaction* 15, no. 2 (2003): 285–295.
- Baker, Lynne Rudder. "Persons and the Extended Mind Thesis." *Zygon(r)* 44, no. 3 (2009): 642–658.
- Becvar, Amaya, James Hollan, and Edwin Hutchins. "Representational Gestures as Cognitive Artifacts for Developing Theories in a Scientific Laboratory." In *Resources, Co-Evolution and Artifacts: Theory in CSCW*, edited by Mark S. Ackerman, Christine A. Halverson, Thomas Erickson, and Wendy A. Kellogg, 117–143. London: Springer, 2008.
- Blood, Anne J., Robert J. Zatorre, Patrick Bermudez, and Alan C. Evans. "Emotional Responses to Pleasant and Unpleasant Music Correlate with Activity in Paralimbic Brain Regions." *Nature Neuroscience* 2, no. 4 (1999): 382–387.
- Boyer, Pascal. "Cognitive Constraints on Cultural Representations: Natural Ontologies and Religious Ideas." In *Mapping the Mind: Domain Specificity in Cognition and Culture*, edited by Lawrence A. Hirschfeld and Susan A. Gelman, 391–411. New York: Cambridge University Press, 1994.
- Carter, J. Adam, Emma C. Gordon, and S. Orestis Palermos. "Extended Emotion." *Philosophical Psychology* 29, no. 2 (2016): 198–217.
- Clark, Andy. "Material Surrogacy and the Supernatural: Reflections on the Role of Artefacts in 'Off-Line' Cognition." In *The Cognitive Life of Things: Recasting the Boundaries of the Mind*, edited by Lambros Malafouris and Colin Renfrew, 23–28. Cambridge, UK: McDonald Institute for Archaeological Research, 2010.
- Clark, Andy. "Re-Inventing Ourselves: The Plasticity of Embodiment, Sensing, and Mind." *Journal of Medicine and Philosophy: A Forum for Bioethics and Philosophy of Medicine* 32, no. 3 (2007): 263–282.
- Clark, Andy. *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford: Oxford University Press, 2008a.
- Clark, Andy. "Where Brain, Body and World Collide." In *Material Agency*, edited by Carl Knappett and Lambros Malafouris, 1–18. Berlin: Springer, 2008b.
- Clark, Andy, and David Chalmers. "The Extended Mind." *Analysis* 58, no. 1 (1998): 7–19.

- Clarke, Eric F. *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*. Oxford: Oxford University Press, 2005.
- Cochrane, Tom. "Expression and Extended Cognition." *Journal of Aesthetics and Art Criticism* 66, no. 4 (2008): 329–340.
- Colombetti, Giovanna, and Joel Krueger. "Scaffoldings of the Affective Mind." *Philosophical Psychology* 28, no. 8 (2015): 1157–1176.
- Colombetti, Giovanna, and Tom Roberts. "Extending the Extended Mind: The Case for Extended Affectivity." *Philosophical Studies* 172, no. 5 (2015): 1243–1263.
- Day, Matthew. "Religion, Off-Line Cognition and the Extended Mind." *Journal of Cognition and Culture* 4, no. 1 (2004): 101–121.
- DeNora, Tia. *Music in Everyday Life*. Cambridge: Cambridge University Press, 2000.
- Dewey, John. *Essays in Experimental Logic*. Chicago: University of Chicago Press, 1916.
- Donald, Merlin. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge, MA: Harvard University Press, 1991.
- Gallagher, Shaun. *How the Body Shapes the Mind*. Oxford, UK: Clarendon, 2005.
- Gallagher, Shaun. "The Socially Extended Mind." *Cognitive Systems Research* 25–26 (2013): 4–12.
- Gallagher, Shaun, and Anthony Crisafi. "Mental Institutions." *Topoi* 28, no. 1 (2009): 45–51.
- Gibbs, Raymond W. *Embodiment and Cognitive Science*. Cambridge: Cambridge University Press, 2005.
- Goldin-Meadow, Susan. *Hearing Gesture: How Our Hands Help Us Think*. Cambridge: Belknap, 2003.
- Hutchins, Edwin. *Cognition in the Wild*. Cambridge, MA: MIT Press, 1995.
- Janata, Petr, Stefan T. Tomic, and Jason M. Haberman. "Sensorimotor Coupling in Music and the Psychology of the Groove." *Journal of Experimental Psychology: General* 141, no. 1 (2012): 54–75.
- Kersten, Luke. "Music and Cognitive Extension." *Empirical Musicology Review* 9, no. 3–4 (2014): 193–202.
- Koelsch, Stefan. "Brain Correlates of Music-Evoked Emotions." *Nature Reviews Neuroscience* 15, no. 3 (2014): 170–180.
- Krueger, Joel. "Affordances and the Musically Extended Mind." *Frontiers in Theoretical and Philosophical Psychology* 4, 1003 (2014a): 1–13.
- Krueger, Joel. "Doing Things with Music." *Phenomenology and the Cognitive Sciences* 10, no. 1 (2011a): 1–22.
- Krueger, Joel. "Emotions and the Social Niche." In *Collective Emotions*, edited by Christian Von Scheve and Mikko Salmela, 156–171. New York: Oxford University Press, 2014b.
- Krueger, Joel. "Enacting Musical Experience." *Journal of Consciousness Studies* 16, no. 2–3 (2009): 98–123.
- Krueger, Joel. "Extended Cognition and the Space of Social Interaction." *Consciousness and Cognition* 20, no. 3 (2011b): 643–657.
- Krueger, Joel. "Musical Manipulations and the Emotionally Extended Mind." *Empirical Musicology Review* 9, no. 3–4 (2014c): 208–212.
- Krueger, Joel. "Musicing, Materiality, and the Emotional Niche." *Action, Criticism, and Theory for Music Education* 14, no. 3 (2015): 43.
- Krueger, Joel. "Varieties of Extended Emotions." *Phenomenology and the Cognitive Sciences* 13, 4 (2014d): 533–555.
- Laird, James D. *Feelings: The Perception of Self*. Oxford: Oxford University Press, 2007.
- Mabbett, Ian W. "Buddhism and Music." *Asian Music* 25, no. 1–2 (1993): 9–28.
- Maiese, Michelle. *Embodiment, Emotion, and Cognition*. New York: Palgrave Macmillan, 2011.
- Malafouris, Lambros. *How Things Shape the Mind: A Theory of Material Engagement*. Cambridge, MA: MIT Press, 2013.
- Markus, Hazel R., and Shinobu Kitayama. "The Cultural Construction of Self and Emotion: Implications for Social Behavior." In *Emotion and Culture: Empirical Studies of Mutual Influence*, edited by Shinobu Kitayama and Hazel R. Markus, 89–130. Washington, DC: American Psychological Association, 1994.
- Marmodoro, Anna. "The Metaphysics of the Extended Mind in Ontological Entanglements." In *The Metaphysics of the Incarnation*, edited by Anna Marmodoro and Jonathan Hill, 205–227. Oxford: Oxford University Press, 2011.
- McCauley, Robert N., and E. Thomas Lawson. *Bringing Ritual to Mind: Psychological Foundations of Cultural Forms*. Cambridge: Cambridge University Press, 2002.
- McNeill, David. *Gesture and Thought*. Chicago: Chicago University Press, 2005.
- Menary, Richard, ed. *The Extended Mind*. Cambridge, MA: MIT Press, 2010.
- Merleau-Ponty, Maurice. *Phenomenology of Perception*. Translated by Colin Smith. New York: Routledge, 1945.
- Merritt, Michele. "Instituting Impairment: Extended Cognition and the Construction of Female Sexual Dysfunction." *Cognitive Systems Research* 25–26 (2013): 47–53.

- Mithen, Steven. "The Supernatural Beings of Prehistory and the External Storage of Religious Ideas." In *Cognition and Material Culture: The Archaeology of Symbolic Storage*, edited by Colin Renfrew and Christopher Scarre, 97–106. Cambridge, UK: McDonald Institute for Archaeological Research, 1998.
- Niedenthal, Paula M. "Embodying Emotion." *Science* 316, no. 5827 (2007): 1002–1005.
- Noë, Alva. *Action in Perception*. Cambridge, MA: MIT Press, 2004.
- Norman, Donald. *Things That Make Us Smart: Defending Human Attributes in the Age of the Machine*. New York: Basic, 1994.
- O'Regan, J. Kevin. *Why Red Doesn't Sound like a Bell: Understanding the Feel of Consciousness*. New York: Oxford University Press, 2011.
- Overy, Katie, and Istvan Molnar-Szakacs. "Being Together in Time: Musical Experience and the Mirror Neuron System." *Music Perception: An Interdisciplinary Journal* 26, no. 5 (2009): 489–504.
- Parkinson, Brian, Agneta H. Fischer, and Antony S. R. Manstead. *Emotions in Social Relations*. New York: Psychology Press, 2005.
- Rizzolatti, Giacomo, and Corrado Sinigaglia. *Mirrors in the Brain: How Our Minds Share Actions and Emotions*. Oxford: Oxford University Press, 2008.
- Rouget, Gilbert. *Music and Trance: A Theory of the Relation between Music and Possession*. Chicago: University of Chicago Press, 1985.
- Rumelhart, David E., Paul Smolensky, James L. McClelland, and Geoffrey E. Hinton. "Schemata and Sequential Thought Processes in PDP Models." In *Parallel Distributed Processing*, edited by James L. McClelland, David E. Rumelhart, and CORPORATE PDP Research Group, 7–57. Cambridge, MA: MIT Press, 1986.
- Rupert, Robert D. *Cognitive Systems and the Extended Mind*. Oxford: Oxford University Press, 2009.
- Sacks, Oliver. *Musicophilia: Tales of Music and the Brain*. London: Picador, 2007.
- Shapiro, Lawrence A. *The Routledge Handbook of Embodied Cognition*. New York: Routledge, 2014.
- Slaby, Jan. "Emotions and the Extended Mind." In *Collective Emotions*, edited by Mikko Salmela and Christian Von Scheve, 32–46. Oxford: Oxford University Press, 2014.
- Small, Christopher. *Musicking: The Meanings of Performing and Listening*. Lebanon, NH: University Press of New England, 1998.
- Stephan, Achim, Sven Walter, and Wendy Wilutzky. "Emotions beyond Brain and Body." *Philosophical Psychology* 27, no. 1 (2014): 65–81.
- Taylor, Richard. *How to Read a Church: An Illustrated Guide to Images, Symbols and Meanings in Churches and Cathedrals*. London: Ryder, 2004.
- Theiner, Georg, Colin Allen, and Robert L. Goldstone. "Recognizing Group Cognition." *Cognitive Systems Research* 11, no. 4 (2010): 378–395.
- Wallace, Wanda T. "Memory for Music: Effect of Melody on Recall of Text." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 20, no. 6 (1994): 1471–1485.
- Ward, Dave. "Enjoying the Spread: Conscious Externalism Reconsidered." *Mind* 121, no. 483 (2012): 731–751.
- Wilson, Robert A. "Meaning Making and the Mind of the Externalist." In *The Extended Mind*, edited by Richard Menary, 167–188. Cambridge, MA: MIT Press, 2010.
- Windsor, W. Luke, and Christophe de Bézenac. "Music and Affordances." *Musicae Scientiae* 16, no. 1 (2012): 102–120.
- Witek, Maria A. G., Eric F. Clarke, Mikkel Wallentin, et al. "Syncopation, Body-Movement and Pleasure in Groove Music." *PLoS ONE* 9, no. 4 (2014): e94446.